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Preface

Abstract

The exponential growth of distributed computer systems (computer networks) demands massive upgrades of capacity in existing systems. Traditional capacity design methodologies, developed with the single-class networking paradigm in mind, overlook the noncooperative structure of modern networks. Consequently, such design approaches entail the danger of degraded performance when resources are added to a network, a phenomenon known as the Braess Paradox. Numerical examples of a Braess-like paradox in which adding capacity to a distributed computer system may degrade the performance of all users in the system have been reported. Unlike the original Braess Paradox, in the models examined, this behavior occurs only in the case of finitely many users and not in the case of infinite number of users, and the degree of performance degradation can increase without bound.

This study examines numerically, some examples around the Braess-like paradox. From the numerical examples, it is observed that, in the class optimum, the worst-case degree of the paradox is largest (i.e., the worst performance is obtained) in the complete symmetry case with the arrival rate being closest to the processing rate. And, as the system parameter setting gradually departs the above-mentioned symmetric case without keeping any kind of symmetries, the worst-case degree of the paradox decreases rapidly. It decreases slowly (more slowly) if the system parameter setting departs the complete symmetry while keeping the individual (overall) symmetry property. Indeed, it is also observed that in complete symmetry, if the communication means of type (A)((B)) is used, the worst-case degree of the paradox converges to a certain limit (may increase without bound) as the arrival rate gets very close to the processing rate, and it increases as the number of nodes in the system increases.

Abstract

Borel and von Neumann two-person zero-sum poker models with independent uniform (0,1) hands are considered. The first two sections describe these Borel and von Neumann and problems with their application in real poker games. Most subsequent work on these models has been to extend the Borel model to allow several rounds of betting or more bet sizes. The von Neumann model, though more closely tied to actual play, is harder to treat mathematically. In this paper we solve several extensions to the von Neumann model. It is generally assumed that players' "hands" are independent random variable, but we weaken this assumption because dealing with finite desk gives the information about opponent's "hand". First, we consider the poker model with in independent not identically distributed "hands". Second, negatively dependent distributions of players' "hands" are examined for

the model. The von Neumann model was extended on the case of non-identically distributed "hands" weakening one assumption about the distributions. The model of poker von Neumann game with dependent "hands" is represented.

Abstract

In this paper a model for the aggregation of Boolean ballot profiles is considered. In this framework we obtain axiomatic characterizations of the majority vote aggregator and the two single valued selections from it. It is also shown in this paper that the unique property which is necessary and sufficient for a Federation Boolean Vote Aggregator to be a Weighted Boolean Vote Aggregator is a property called robustness.

Abstract

We consider here n-person time-sequential game related with the best-choice problem. The game consists of at the most k steps. In k-step i-player receives an offer $x_i^{(k)}$. We suppose that $x_1^{(k)}, x_2^{(k)}, ..., x_n^{(k)}$ are independent random variables. As the collection of the offers comes up, players must decide whether to accept it or reject it expecting that a more favorable solution may come up in the near future. After all players make a choice then we calculate the number of players who choose whether to "accept" or "reject" their offers respectively. If the number of players choosing "reject" is greater or equal to the number of players choosing "accept" the game continues and the players move to $k-1$ step. Otherwise, the game stops and each of the players receives the corresponding offer $x^{(k)}$. The process continues until either more than half of players accept their offers or until the step $k=0$ takes place where all players receive nothing. Each player is interested to maximize his expected payoff.

Abstract

Game-theoretic models related to a bioresource management problem (fish catching) are investigated. The players (countries or fishing firms) which harvest the fish stock are the participants of the game. The center (state) determines the reserved portion of the reservoir (where fishing is prohibited). In traditional statement the center's objective is catch regulation by introduction quotas. In this paper the center's task is to determine the optimal reserved portion of the reservoir to maintain stable population development. The models, which allows the existence of more that one age class of fish in the reservoir, are investigated. The Nash equilibrium and bargaining solutions are obtained.

Abstract

The dynamic fishery harvesting game is generalized to a stochastic environment, in order to examine the implications of incomplete and asymmetric information. The main emphasis is on a split-stream version of the game: At the beginning of each harvest season the initial fish stock divides into two streams, each one accessible to harvest by just one of the two competing fishing fleets. The fleets simultaneously harvest down their streams. After harvest, the residual sub-stocks reunite, to form the brood stock for the subsequent generation. In this cyclic process, natural environmental factors will incorporate Markovian stochastic elements. At the beginning of each season, the fleets both know current recruitment, and also have some (generally incomplete or delayed, and often asymmetric) knowledge of the current values of stochastic elements. In the dynamic game each fleet sets its harvest policy, with the objective of maximizing the expected discounted sum of seasonal payoffs, and conditional on the extent of its current knowledge, and of the anticipated policy of its competitor. The implications of alternative knowledge-structures are explored, through dynamic programming and simulation. Particular focus is on demonstrating the often unexpected, and sometimes counter-intuitive, effects that knowledge enrichment may have, in these incomplete-information, common-property games.

Abstract

Leader-follower games could be a good framework to model some economic problems arising when agents want to imitate each other, because some of them are better informed than the others. A two-level stock market imitative problem with two leaders (well informed) and one follower is considered. The follower wants to imitate one or both leaders, maximizing his own payoff. The purposes of the paper is to show the relationship between the optimal solutions of three players and to estimate parameters to have a measure of the credibility of followers strategy for the given behavior of the other two players. This measure could be also interpreted as parameter estimating the reputation of the two leaders. The follower can give different weights to different types of leaders' behavior, then observations and, as a consequence, the estimation of the parameters, are necessary to budget his behavior. In financial applications, interactions among gents are repeated more times if interaction is profitable. This leads to considering a dynamic problem. In this way, if the follower has a good estimation of credibility parameters, with respect to leaders' behavior, a good level of credibility guarantees the dynamicity of the hierarchic game model. The dynamics is represented by repetitions of the static game in different time-intervals.

Abstract

The paper examines two-person nonzero-sum stochastic games of capital accumulation. It is proved that every two-person nonzero-sum infinite horizon stochastic game of capital accumulation has a nonrandomized stationary Nash equilibrium under a certain assumption on the transition probability function. The approach taken in this paper is not based on a fixed point argument. The authors construct a sequence of Nash equilibria in the finite horizon games such that the corresponding equilibrium payoff functions are convergent. It turns out that the limits are the equilibrium payoff functions for the infinite horizon discounted stochastic game. It is also shown that a stationary Nash equilibrium pair exists in the infinite horizon model.

Abstract

Time-consistency and strongly time-consistency problems for cooperative differential n-person games with random duration are considered. It is proved, that in many cases the solution (or optimality principle) for such games is time-inconsistent. For regularization of solution the special imputation distributed procedure (IDP) is introduced and the (strongly) time-consistency of the new regularized optimality principle proved. The example of 3-person differential game with random duration is investigated and the regularized Shapley Value (RSV) computed in analytic form.

Abstract

We first consider a simple n–round poker. Each of two players I and II receives a hand x and y, respectively, in $[0, 1]$, according to a uniform distribution, and chooses one of two alternatives Reject or Accept. If choice–pair is R–R, the game proceeds to the next round and both players are dealt new hands x and y. If the chice–pair is A–A showdown occurs and the game ends with I's reward $sgn(x-y)$. If players choose different choices, then arbitration comes in, and forces them to take the same choices as I's (II's) with probability p ($\bar{p}$). This zero–sum game is played in n–rounds, and player I(II) aims to maximize(minimize) the expected reward to I.

Abstract

The main result of the paper establishes the minimax equality under quantitative-type conditions. One extends the Fan-Kőnig minimax theorem avoiding topological assumptions.

Abstract

Bruss (1987) studied a continuous-time generalization of the secretary problem. In this paper we investigate optimal strategies for two versions of Bruss' problem. In these modifications we use different goal functions. In Section 2 we analyze a case when the objective is stop on the best or on the second best object (apartment). In Section 3 the aim is to stop on the second best object. We give the optimal strategies and the value (probability of success) of the optimal strategy for both cases.

Abstract

We consider the problem of assigning bandwidth to calls which have minimum bandwidth requirements. We provide a general computational tool for joint routing as well as bandwidth allocations in networks which is based on Semi-Definite Programming (SDP). The advantage of our approach is that many appealing complex objective functions that appear in network optimization problems (especially those related to fair bandwidth allocation problems) are shown to be special cases of our formalism, and such optimization problems can be solved in an automatic manner whenever a standart SDP software package is available to the network manager. Our approach produces the solutions to the two problems stated, of bandwidth allocation for ATM and for Internet networks. The paper concludes with a select number of numerical illustrations of the behaviour of the optimal solution in terms of fairness.

Abstract

The paper considers the Cournot oligopoly with heterogeneous producers. For a demand function with the non-decreasing elasticity, we establish the existence of the unique Nash equilibrium and evaluate the deviation of the Nash equilibrium outcome from the Walrasian outcome. We study also a model of the sealed bid auction and show that any Nash equilibrium price lies between the Walrasian price and the Cournot price. We discuss application of these results to electricity markets.

Abstract

We consider the following problem (M.A. Sukhotina and L. A. Petrosyan): (Learning procedure A.) Let $G = (X, \Gamma)$ be an arbitrary network, where X is the set of nodes (players). Each player repeatedly plays with his neighbours the same mxm bimatrix symmetric game with the payoff matrix $(\alpha_{ij}, \beta_{ij})$

where $\alpha_{ij} = \beta_{ji}$. By $K = \{1, 2, \ldots, m\}$ denote the set of strategies. At the first stage of the game the players use initial strategies $L_1 = \{l_{x1}\}$. Suppose a player x uses a strategy i and a set of strategies of his neighbours is J. Choose $j \in J$ such that β_{ij} has the maximal value. At the following stage of the game the player x uses the strategy j if $\alpha_{ij} < \beta_{ij}$ or keeps the strategy i in the opposite case. All players change their strategies by this way. Assume that all α_{ij} are pairwise distinct for the unambiguousness of the algorithm.

Thus we have the sequence of $L_k = \{l_{xk}\}$. We say that the learning procedure A converges if there exists a k' such that $L_k = L_{k'}$ for $k \geq k'$. The problem is to study when the convergence takes place.

In the sequel we obtain some sufficient conditions for the convergence of this procedure on a finite network, on a finite linear network, on a finite tree, and on an arbitrary network.

Abstract

This paper widens the scope of endogenous-horizon differential games by introducing uncertainty into the model along the line of the work of Yeung (2001 and 2003). In particular, we propose a new class of games - designated as *endogenous-horizon randomly furcating stochastic differential games*. The analysis allows random shocks to appear in the players' future payoffs. Since these payoffs are uncertain, the term "randomly furcating" is introduced to emphasize that a useful way to analyze such situations is to assume that payoffs change at any instant of time according to known probability distributions defined in terms of multiple-branching stochastic processes.

Abstract

We firstly introduce an evaluation method of fuzzy numbers called the mean value with evaluation measures. Then, using this notion, a stopping game model with fuzzy random variables could be formulated. When a sequence of fuzzy-valued random variables(fuzzy RV) are observed, the important problem is how to treat and analyze the model. Previously the observed fuzzy RV's are evaluated by probabilistic expectation and scalarization functions, that is, λ-weighting functions and fuzzy

Abstract

The paper studies a problem of sharing a communication link to a common source by means of non-cooperative game theory. In the considered model, a payoff to any player is given by a gap payoff function which satisfies specific properties when total load exceeds some fixed level. This assumption was made to formalize a border between high grade of service and lower one. It is proposed the sufficient conditions for existence of Nash equilibrium for considered class of games. A method to calculate Nash equilibrium and to find routing strategies which guarantee high grade of service is presented. The results are extended to a case of multiple communication links. In this setting, players may choose multiple links to connect to the common source. Similar propositions on existence of Nash equilibrium are provided.

Abstract

Valuable contribution to development of cooperative games theory was made, however, but it was not taken in account the perturbations, noises and other types of uncertainties. The only thing known about these uncertainties is the range of changes but any statistical characteristics are usually absent. Such uncertainties arise in many economic problems. These uncertainties may be changes of the demand for the produced goods, changes of quantity and nomenclature of the suppliers, breakage and replacement of an equipment, unexpected appearance of competitors, natural phenomena, etc. It is natural to pass from the multicriteria problems to the game theoretic problems under uncertainties for choosing optimal strategies taking in account these uncertainties. The authors consider three player cooperative games and investigate only the imputations. The paper consists of two sections. The first section is devoted to the cooperative games under uncertainty and without side payments. In the second section the same games but with side payments are considered. Each section includes two parts, one of which deals with "pure" uncertainties and the other one deals with "informed" uncertainties.